REMARKS

Claims 1-7 are currently pending in the application. Claims 1, 3, and 6-7 have been amended. No claims have been canceled. Applicant respectfully submits that no new matter has been added. Applicant respectfully requests reconsideration of the application in view of the foregoing amendments and the following remarks.

Claims 1-7 stand rejected under rejected under 35 U.S.C. § 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicant regards as the invention. In response, Applicant has amended claims 1 and 6-7 to overcome the § 112 rejection.

In particular, claims 1-7 stand rejected due to alleged indefiniteness of the terms "high degree of clustering" and " low average path length". Applicant respectfully submits that the amended claims clarify the standard against which the requisite degree of clustering and average path length should be ascertained. In particular, the amended claims make clear that cross-links are such that the inventive system comprises a small-world network, characterized in that there is a substantially higher clustering coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding regularly-connected network. Applicant further submits that the amendments thereby import into the claims a definition of the small-world principle as set out in the specification on page 6, lines 3-18. Accordingly, the relevant limitations are explicitly recited in the claims, and may be readily interpreted by one of ordinary skill in the art, in light of the specification, in determining the scope of the invention. Applicant respectfully submits that the skilled person will have no difficulty in interpreting the terms "substantially higher clustering coefficient" and "substantially lower characteristic path length" in view of the specification, and particularly in light of the description at page 6, lines 16-18, and Figure 4. Applicant therefore respectfully requests that the 35 U.S.C. 112, second paragraph rejections of claims 1-7 be withdrawn.

Claims 1-3 and 7 stand rejected under rejected under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 5,602,839 to Annapareddy et al. ("Annapareddy").

Annapareddy discloses a multinode communication or multiprocessor network in which messages are communicated from one node to another using an adaptive and dynamic routing scheme. The routing scheme includes two-level multi-path routing tables at each node to ensure efficient delivery of the messages. The routing scheme also includes a deflection counter in each message header to avoid endless rerouting of messages and an exponential back off and retry policy to avoid deadlocks.

Independent claim 1 discloses a system comprising a plurality of computing nodes interconnected to form a plurality of node clusters. Applicant respectfully submits that Annapareddy fails to teach, suggest, or anticipate at least one of the distinguishing features of independent claim 1, namely, cross-links are provided between node clusters and wherein the cross-links are selected such that the system comprises a small-world network. In addition, Annapareddy fails to disclose the small-world network comprising a substantially higher clustering coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding randomly-connected network.

In contrast to claim 1, Annapareddy illustrates for example, in Figure 2, that node n3 of group G1, node n3 of group G3 and node n1 of group G4 are as densely interconnected as the nodes within any of the individual groups, and accordingly that the depicted network has a far higher degree of cross-linking than would be the case if it had been designed and constructed according to the small-world network principle as found in the present invention of independent claim 1. Additionally, the group G2 of the network illustrated in Figure 2 of Annapareddy includes four nodes, six internal interconnections and five external links, all of the same magnitude. The group G2 is thereby directly connected to a majority of the other groups in the network. Indeed, each of the six groups in the network is connected on average to three of the remaining groups via a number of cross-links that is comparable to the number of internal connections within the group. Applicant respectfully submits that the network depicted in Figure 2 of Annapareddy is a substantially regularly-connected network having a high degree of interconnection and does not exhibit any of the characteristics of a small-world network, as defined in independent claim 1.

In view of the foregoing, Applicant respectfully submits that Annapareddy fails to teach or suggest at least the feature of independent claim 1 of "wherein the small-world network comprises a substantially higher clustering coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding randomly-connected network." Applicant respectfully submits that independent claim 1 distinguishes over Annapareddy and requests that the 35 U.S.C. 102(b) rejection of independent claim 1 be withdrawn.

Dependent claims 2-3 depend from and further restrict independent claim 1 in a patentable sense. Applicant respectfully submits that, for at least the reasons set forth above with respect to the rejection of independent claim 1, dependent claims 2-3 distinguish over Annapareddy and are in condition for allowance. Withdrawal of the rejection of dependent claims 2-3 is respectfully requested.

Independent claim 7 discloses a scalable computer system. Applicant respectfully submits that Annapareddy fails to teach, suggest, or anticipate at least one of the distinguishing features of independent claim 7, namely, cross-links are provided between nodes of different clusters in a network and wherein the cross-links are selected such that the system comprises a small-world network. In addition, Annapareddy fails to disclose the small-world network comprising a substantially higher clustering coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding randomly-connected network.

Annapareddy also fails to disclose a scalable computer system, at least because a system with a high degree of interconnection between clusters illustrated in Figure 2 of Annapareddy is not scalable. Rather, the required number of cross-links multiplies as the number of nodes/clusters is increased, which severely limits scaling by comparison with a system designed and interconnected according to small world principles. As the name "small-world" suggests, and as discussed in the specification at page 8 lines 19-26 and page 10 lines 3-14, a key feature of the small-world architecture employed by the present invention is the massive scalability possible when it is recognized that only a relatively small number of cross-links is required between clusters. This degree of scalability is not possible with conventional approaches to network design, and it is noted that Annapareddy does not address

the problem of network scalability. Rather, Annapareddy is directed to the problem of routing messages within a pre-existing network.

In contrast to claim 7, Annapareddy illustrates for example, in Figure 2, that node n3 of group G1, node n3 of group G3 and node n1 of group G4 are as densely interconnected as the nodes within any of the individual groups, and accordingly that the depicted network has a far higher degree of cross-linking than would be the case if it had been designed and constructed according to the small-world network principle as found in the present invention of independent claim 7. In view of the foregoing, Applicant respectfully submits that Annapareddy fails to teach or suggest at least the feature of independent claim 7 of "wherein the small-world network comprises a substantially higher clustering coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding randomly-connected network." Applicant respectfully submits that independent claim 7 distinguishes over Annapareddy and requests that the 35 U.S.C. 102(b) rejection of independent claim 7 be withdrawn.

Claims 4-5 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Annapareddy in view of Watts et al. ("Watts"). Dependent claims 4-5 depend from and further restrict independent claim 1 in a patentable sense. Applicant respectfully submits that, for at least the reasons set forth above with respect to the rejection of independent claim 1, dependent claims 4-5 distinguish over Annapareddy and Watts and are in condition for allowance. Withdrawal of the rejection of dependent claims 4-5 is respectfully requested.

Claims 6 stands rejected under 35 U.S.C. 103(a) as being unpatentable over as being unpatentable over Annapareddy in view of U.S. Patent No. 5,859,975 to Brewer et al. ("Brewer").

Independent claim 6 discloses a large scale computer system. Applicant respectfully submits that the cited combination of Annapareddy and Brewer fail to teach, suggest, or render obvious at least one of the distinguishing features of independent claim 6, namely, cross-links are provided between nodes of different clusters in a network and wherein the cross-links are selected such that the system comprises a small-world network. In addition, Annapareddy and Brewer fail to disclose the small-world network comprising a substantially higher clustering

coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding randomly-connected network.

In contrast to claim 6, Annapareddy illustrates for example, in Figure 2, that node n3 of group G1, node n3 of group G3 and node n1 of group G4 are as densely interconnected as the nodes within any of the individual groups, and accordingly that the depicted network has a far higher degree of cross-linking than would be the case if it had been designed and constructed according to the small-world network principle as found in the present invention of independent claim 6. Brewer fails to cure the deficiencies of Annapareddy noted above. In view of the foregoing, Applicat respectfully submits that Annapareddy and Brewer fail to teach, suggest, or render obvious at least the feature of independent claim 6 of "wherein the small-world network comprises a substantially higher clustering coefficient of nodes in combination with a substantially lower characteristic path length between the nodes in comparison with a corresponding randomly-connected network." Applicant respectfully submits that independent claim 6 distinguishes over the cited combination of Annapareddy and Brewer. Withdrawal of the rejection of independent claim 6 is respectfully requested.

In view of the above amendments, Applicant believes the pending application is in condition for allowance.

Dated: Oct. 31, 2005

Respectfully submitted,

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